PERFORMANCE IMPROVEMENT OF TRAFFIC AT TOLL PLAZA

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ABSTRACT: The project mainly focuses on the Automation of the Toll Plazas for smoother movement of the traffic to in turn benefit the people by saving their time and money.Traffic has tremendous growth in recent years. With the growth in the number of vehicles the need for expansive roads catering to thousands of vehicles moving across India has become inevitable. However, considering the present situation the current toll system has several drawbacks. Due to the limited number of toll booths and slow collection process, the average waiting time per vehicle is 10 minutes. As vehicular traffic began to increase, the congestion on toll plaza began to hamper the safe and efficient movement of traffic. It will cause many traffic problems such as more fuel consumption, traffic delay, air pollution etc. Therefore there is an urgent need for performance improvement of traffic at toll plaza. Hence the objective of this study will be to develop some significant strategies for performance improvement of traffic at toll plaza. It is expected that this study will be useful to decision makers to take significant decisions for proper planning and designing of toll plaza.

Index Terms–Toll Plaza, Automatic Toll Collection,Toll Collection Mobile Application, High Speed Camera,RFID

INTRODUCTION

The amount of traffic in recent years has been steadily increasing due to the ever increasing number of vehicles .Everyday, Millions of commuters take to their own personal vehicles in place of public transport systems .This leads to steady increase in Vehicle traffic in developing countries. The only possible solution is to build more number of wider roads. Often the government is in short of funds, hence "tolling systems" are used to collect funds as the vehicles use these toll roads. Conventional tolling system requires the vehicle to stop at a toll gate and the toll fee is manually paid. This is a slow system as manual processing often leads to delay and customers have to wait. In our day to day life, we pay certain amount of tax through toll plaza to the government. The toll gates are mostly found on national highways and bridges etc., and we pay standing over a queue in the form of cash, although, the mobility of vehicles gets interrupted by this method which takes longer travel time, more consumption of fuel and also pollution level get increased in that region.

Effect on implementing a new toll collection system
- Need to ensure error free, custom assembly
- Need inventory of components for the various customization options
- Critical Issues
  - Assembly process control
  - Inventory management
  - Supply chain integration
  - Customer insight

OBJECTIVES

The objective of this study will be to develop some significant strategies for performance improvement of traffic at toll plaza. It is expected that this study will be useful to decision makers to take significant decisions for proper planning and designing of toll plaza. Easiness to the users to crossing the toll plaza.

SCOPE OF THE PROJECT

Whenever the matter of Integration of systems comes to mind, we think of a system having the following important features viz. Accuracy: All the functionally bonded logical dependencies must be integrated. Efficiency: The whole system should work under all circumstances and on a long run it should work efficiently irrespective of their proprietary format. Cost Effectiveness: As our software do not require any special software for implementation hence is less costly as compared to other existing system. Any Prerequisite for the use: As the existing systems are not altered, and integration is done at the background hence there is no need for any training.

FEASIBILITY STUDY

Vehicle	Days	Toll Booth
100	1	1
36000	30 x 12	1
3600000	30 x 12	100

Table 1. Vehicles Passed away from Toll Booth in 1 year

Vehicle	Fuel Consumed	Amount
1	1 lit.	75/- Rs
3600000	3600000 lit.	270,000,000/- Rs

Table 2. Fuel Consumption and Amount

Assuming cost of 1 liter fuel = Rs.75

Total cost of fuel consumed by 36, 00000 vehicles = 75 x 36, 00,000 = Rs. 270,000,000/-

The above is the money wastage under the consideration that the vehicle stops for 60 second at the toll system, and 100 vehicles pass through the toll plaza each day and there are 100 toll plazas. These figures are all in minimum.

One additional stop every 10 km increases the fuel consumption by approximately 35%. If we consider 10 stops and accelerations per 10 km, then increase in fuel consumption is 130%.

Speed	10	20	30	40	50	60	70	80
Fuel	21.00	13.00	10.00	8.00	7.00	5.90	6.30	6.95

Table-3 Speed Vs Fuel consumption

METHODOLOGY

The toll app is providing to the customer to prepaid of toll tax. the collaboration between National Highway Authority of India (NHAI) & Regional Transport Office(RTO) is required in this toll app. by using GPS we can get the information and exact location of toll plaza on the national highways so, we should pay the toll tax before reaching the toll plaza so, the traffic congestions will be less on toll plaza after the successfully use the toll app by Road user

## Applications for implementation of new toll collection system
- ➢ Manufacturing and Processing
  - ✓ Inventory and production process monitoring
  - ✓ Warehouse order fulfillment
- ➢ Supply Chain Management
  - ✓ Inventory tracking systems
  - ✓ Logistics management
- ➢ Retail18
  - ✓ Inventory control and customer insight
  - ✓ Auto checkout with reverse logistics
- ➢ Security
  - ✓ Access control
  - ✓ Counterfeiting and Theft control/prevention
- ➢ Location Tracking
  - ✓ Traffic movement control and parking management
  - ✓ Wildlife/Livestock monitoring and tracking

RFID deployment challenges
- ➢ Manage System costs
  - ✓ Choose the right hardware
  - ✓ Choose the right integration path
  - ✓ Choose the right data infrastructure
- ➢ Handle Material matters
  - ✓ RF Tagging of produced objects
  - ✓ Designing layouts for RF Interrogators
- ➢ Tag Identification Scheme Incompatibilities
  - ✓ Which standard to follow?
- ➢ Operating Frequency Variances
  - ✓ Low Frequency or High Frequency or Ultra High Frequency
- ➢ Business Process Redesign
  - ✓ New processes will be introduced
  - ✓ Existing processes will be re-defined

Steps & key feature of this toll app.
1. Download the toll app for free
2. Enter the origin and destination of the journey
3. Select the type of vehicle (CAR, LCV, BUS, HCV, etc.)
4. Saw the list of toll plaza
5. Check the price of toll tax for our vehicle
6. Enter the details of the users and their vehicles
7. Going for payment option
8. Choose the payment mode
9. Get conformation message of the toll payment from toll plaza
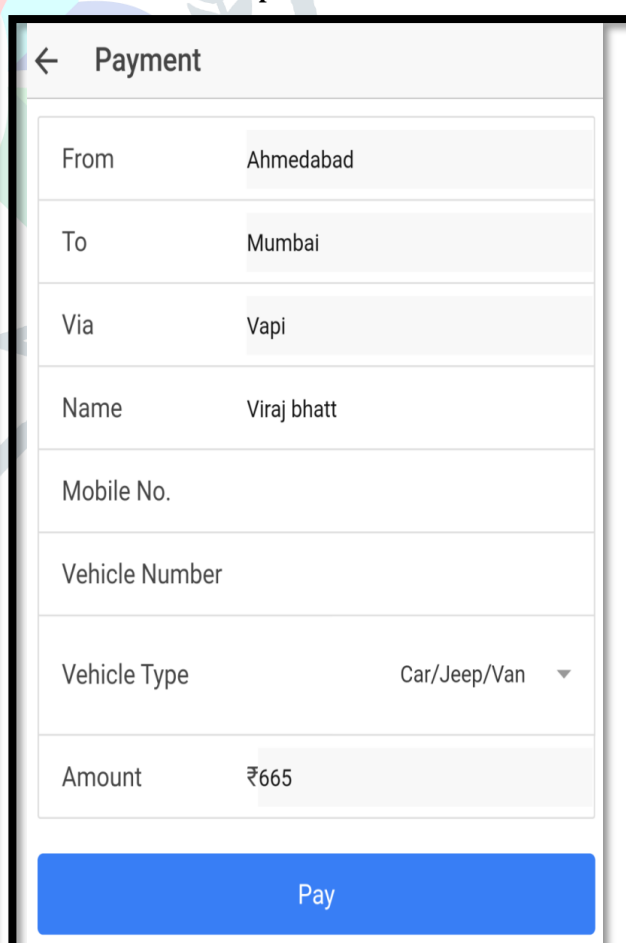10. Now your vehicle is able to pass from the every toll plaza in your journey without delay
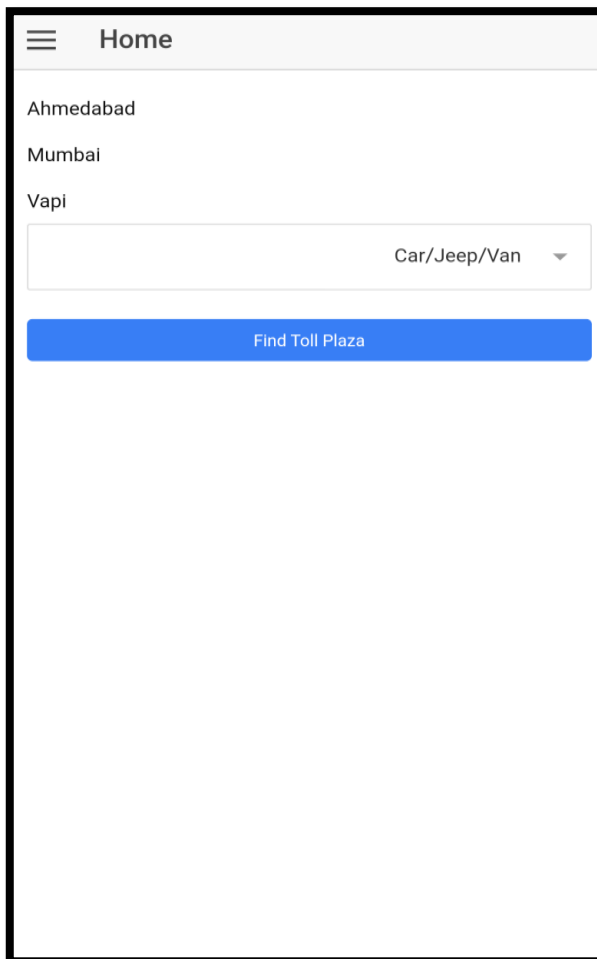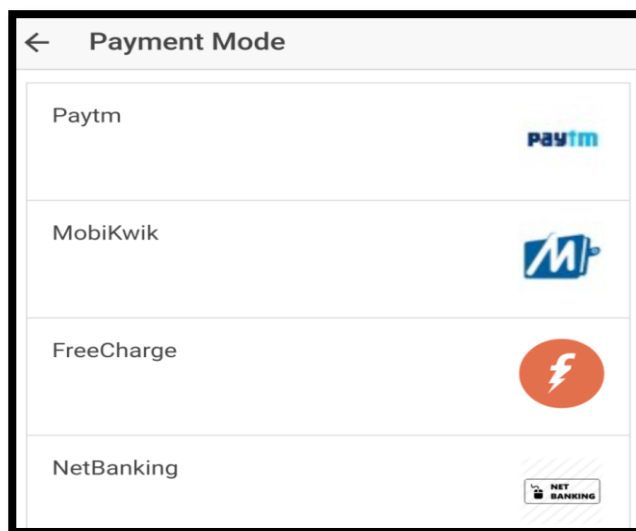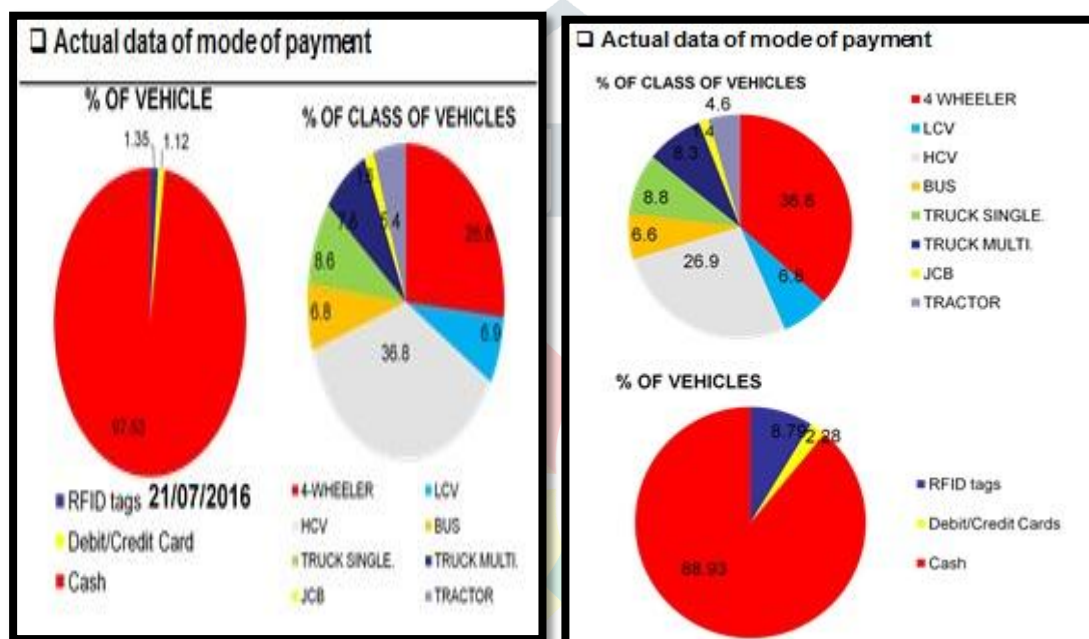
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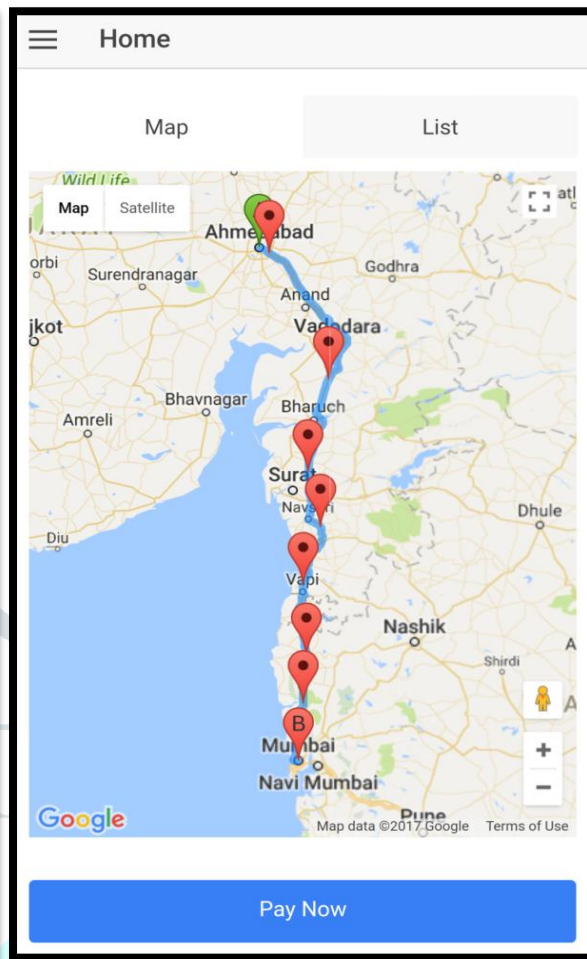
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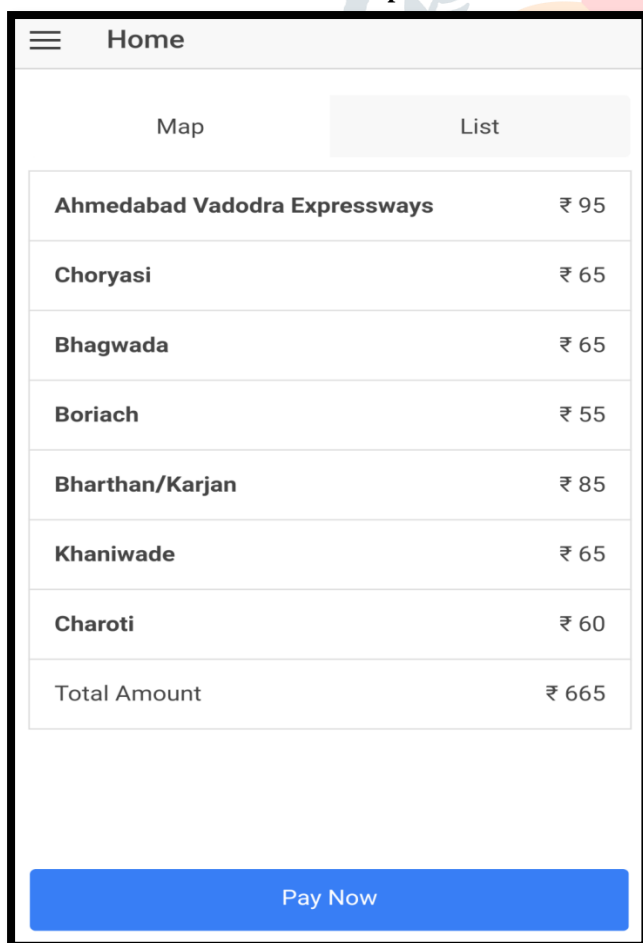
Step No. 3

Step No. 4

Step No. 5

- ➤ We have conducted the Traffic VolumeCount survey at the Mandal toll plaza Songadh.
- ➤ The 1st pie chart represents that the actual data of mode of payment survey which is conducted on 21/07/2016 (before the demonetization).There's three types of mode of payment on a toll plaza.
    - ✓ Toll tax Payment by using RFID tags
    - ✓ Toll tax payment by using debit/credit cards
    - ✓ Toll tax Payment by using Cash
- ➤ It shows that the 97.53% of road users preferred cash payment on the toll plaza, 1.35% of road users preferred RFID system to pay the toll tax and rest of 1.12% of road users preferred to pay toll tax by debit/credit card payment.

- ➤ The 2nd pie chart represents that the actual data of mode of payment survey which is conducted on 10/03/2017(after the demonetization).There's three types of mode of payment on a toll plaza.
    - ✓ Toll tax Payment by using RFID tags
    - ✓ Toll tax payment by using debit/credit cards
    - ✓ Toll tax Payment by using Cash
- ➤ It shows that the 88.93% of road users preferred cash payment on the toll plaza, 8.71% of road users preferred RFID system to pay the toll tax and rest of 2.28% of road users preferred to pay toll tax by debit/credit card payment.
- ➤ As per our TVC survey, we saws that there is almost 88% of road users are still preferring to pay toll tax by the cash payment. And if road users are not using new techniques of toll payment by RFID technology then the congestion on the toll plaza will still getting hamper. There's lack of awareness about the RFID technology toll payment method.
- ➤ Main Advantages of Toll payment by using Application
    - ✓ Reduce time for collection of Toll at Toll Plaza
    - ✓ Smooth traffic flow at toll gates
    - ✓ Reduction of Management costs
    - ✓ The well timed notification to Users Via the Push notification that informs them about their current account status
    - ✓ Minimizes Air Pollution

CONCLUSION

- As per our TVC survey before demonetization there were only 1.35% of RFID users and 97.53% of users were paid the tax by cash And after the demonetization significant increase of 8.79% of RFID users. so, 551% of growth in the RFID Mode of Payment system is observed.
- So, if users preferred to pay the tax by cash payment then there will be never significant decrease in the congestions of traffic at a toll plaza.
- So we concluded that if User Friendly System for Toll Tax payment is available then users will be encouraged to use the E-Payment system and to fulfil that our Toll-App is The best solution.
- In RFID System Significant change is seen for the payment mode and cash payment in last few month is increased.
- It is expected that this study will be useful to decision makers to take significant decisions before implementation of new toll plaza and expansion of existing toll operations.

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